

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of claims:

Claims 1- 36 (CANCELED)

37. (CURRENTLY AMENDED) A CMP retaining ring, comprising:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower substrate surface of a substrate;

a plurality of grooves on said lower surface of said CMP retaining ring; each groove of said plurality of grooves continuously extends entirely across said lower surface extending from said inner peripheral surface to said outer peripheral surface;

said plurality of grooves are spaced apart;

said plurality of grooves include includes at least a first groove and a second groove;

at least a portion of said first groove not adjacent to the lower surface has a rounded cross-sectional cross-sectional contour along substantially the entire length of said first groove -or slanted-cross sectional contour.

38. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said lower surface of said retaining CMP ring is essentially flat with only said plurality of grooves therein.

39. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said plurality of grooves do not intersect; said plurality of grooves do not communicate with each other; each groove of said plurality of grooves only communicates communicate between said inner peripheral surface and said outer peripheral surface; said first groove forms a first inner

peripheral surface opening in the inner peripheral surface and a first outer peripheral surface opening in the outer peripheral surface.

40. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said plurality of grooves are linear; and each groove of said plurality of grooves are is uninterrupted extending continuously the entire distance from said inner peripheral surface to said outer peripheral surface; and said lower surface does not comprise an annular recess.

41. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said first groove has a semicircle cross-sectional profile along said first groove's entire length; and wherein said second groove has a semicircle profile along substantially the entire length of said second groove; each groove of the plurality of grooves communicates between the inner peripheral surface and the outer peripheral surface.

42. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein each groove of said plurality of grooves has have a semicircle cross-sectional profile along substantially [[the]] their entire length extending continuously in said lower surface the entire distance from said inner peripheral surface to said outer peripheral surface.

43. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said first groove has a semicircle cross-sectional profile and said first groove has a rounded top corner adjacent to the lower surface of the CMP retaining ring.

44. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said first groove has a semicircle cross-sectional profile; with a radius between 2 and 15 mm
said first groove has a rounded top corner adjacent to the lower surface of the
CMP retaining ring; and
each groove of said plurality of grooves is linear.

45. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said first groove is comprised of: sidewalls, a flat horizontal bottom, and rounded bottom corners between said

sidewalls and said flat horizontal bottom; and

said first groove has curved sidewalls with a curved cross-sectional cross-sectional shape.

46. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 37 wherein said first groove has rounded corners adjacent to a bottom of said first groove.

47. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said first groove has rounded top corners adjacent to the lower surface of said CMP retaining ring.

48. (CURRENTLY AMENDED) The CMP retaining ring of claim 37 wherein said first groove has vertical sidewalls, [[and]] an about horizontal bottom and at least one rounded corner between said vertical sidewalls and said horizontal bottom; and said first groove having rounded top corners near the lower surface of said CMP retaining ring.

49. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 37 wherein said first groove has straight sidewalls, top corners, bottom corners,[[;]] and an about horizontal bottom; [[,]] said bottom corners are rounded or curvilinear; and said bottom corners are adjacent to said horizontal bottom and said straight sidewalls.

50. (CURRENTLY AMENDED) A CMP retaining ring, comprising:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower substrate surface of a substrate;

a plurality of grooves on said lower surface of said CMP retaining ring;

[[and]] each groove of said plurality of grooves continuously extends extending an entire distance from said inner peripheral surface of said CMP retaining ring[[,]] to said outer peripheral surface of said CMP retaining ring; said first groove forms a first inner peripheral surface opening in the inner peripheral surface and a first outer peripheral surface opening in the outer peripheral surface;

each groove of said plurality of grooves communicates between said inner peripheral surface and said outer peripheral surface;

said plurality of grooves are spaced apart; said plurality of grooves only communicate between said inner peripheral surface and said outer peripheral surface;

said plurality of grooves ~~include~~ includes at least a first groove and a second groove; and

at least a portion of said first groove not adjacent to the lower surface has a rounded ~~cross~~ sectional cross-sectional contour along substantially the entire length of the first groove or slanted cross sectional contour.

51. (CURRENTLY AMENDED) The CMP retaining ring of claim 50 wherein each groove of said plurality of grooves ~~are~~ is uninterrupted continuously extending from said inner peripheral surface to said outer peripheral surface; and said lower surface does not comprise an annular recess.

52. (CURRENTLY AMENDED) The CMP retaining ring of claim 50 wherein said first groove has a semicircle cross-sectional profile along the entire length of said first groove; and said second groove has a semicircle cross-sectional profile along the entire length of said second groove.

53. (CURRENTLY AMENDED) The CMP retaining ring of claim 50 wherein said first groove has a semicircle cross-sectional profile and said first groove has a rounded top corner adjacent to the lower surface of the CMP retaining ring.

54. (CURRENTLY AMENDED) The CMP retaining ring of claim 50 wherein said first groove has a semicircle cross-sectional profile; ;
said plurality of grooves are linear; and
each groove of said plurality of grooves ~~are~~ is uninterrupted extending from said inner peripheral surface to said outer peripheral surface;

at least a portion of said second groove not adjacent to the lower surface has a rounded cross-sectional contour extending substantially the entire length of the second groove; and said lower surface does not comprise an annular recess.

55. (CURRENTLY AMENDED) A process for chemical-mechanical polishing a substrate comprising:

[[said]] providing a substrate [[is]] disposed within a polishing head facing a polishing table; said substrate is retained within the polishing head by a retainer retaining ring, and

said retaining ring is comprised of:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower substrate surface of the substrate;

a plurality of grooves on said lower surface of said retaining ring; each groove of said plurality of grooves continuously extends entirely across said lower surface extending from said inner peripheral surface of said retaining ring to said outer peripheral surface of said retaining ring; each groove of said plurality of grooves communicates between said inner peripheral surface and said outer peripheral surface;

said plurality of grooves are spaced apart;

said plurality of grooves only communicate between said inner peripheral surface and said outer peripheral surface;

said plurality of grooves includes, include at least a first groove and a second groove;

at least a portion of said first groove not adjacent to said lower surface has a rounded cross-sectional cross-sectional contour along substantially the entire length of said first groove; or slanted cross sectional contour;

supplying a slurry to said polishing table or to said polish head; and

moving the polishing table and/or the polishing head to chemically polish the substrate.

56. (CURRENTLY AMENDED) The process of claim 55 which further includes: said substrate is a wafer; forming a deposition layer on the surface of said wafer; and chemical mechanically polishing said deposition layer.

57. (CURRENTLY AMENDED) The process of claim 55 wherein said first groove has a semicircle cross-sectional profile along substantially the entire length of said first groove extending continuously the entire distance from said inner peripheral surface to said outer peripheral surface; and
said first groove forms a first inner peripheral surface opening in the inner peripheral surface
and a first outer peripheral surface opening in the outer peripheral surface.

58. (CURRENTLY AMENDED) The process of claim 55 wherein said first groove has a semicircle cross-sectional profile and said first groove has a rounded corner adjacent to the lower surface of the retaining ring.

59. (CURRENTLY AMENDED) The process of claim 55 wherein each groove of said plurality of grooves are is uninterrupted extending continuously from said inner peripheral surface to said outer peripheral surface;

 said lower surface does not comprise an annular recess;

said first groove has a semicircle profile along substantially an entire length of said first groove extending continuously the entire distance from said inner peripheral surface to said outer peripheral surface; said first groove forms a first inner peripheral surface opening in the inner peripheral surface and a first outer peripheral surface opening in the outer peripheral surface;

said first groove has a semicircle cross-sectional profile and said first groove has a rounded corner adjacent to the lower surface of the retaining; and

said plurality of grooves are linear.

60. (CURRENTLY AMENDED) The process of claim 55 wherein said first groove has rounded edges adjacent to [[the]] a bottom of said first groove.

61. (PREVIOUSLY PRESENTED) The process of claim 55 wherein said first groove has rounded top edges adjacent to the lower surface of said retaining ring.